

cusps at the apex, one on each side. The metanotum and the first abdominal segment are roughened; not the first three abdominal segments, as stated in my former paper.

**Brachaspis terrestris.** Plate II., fig. 14.

The centre of the sternal shield in my only specimen has been destroyed by the pin, so that I cannot give a description of it. The subgenital plate in the female is rounded at the apex. The hind tibiæ have eight spines in the outer row.

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EXPLANATION OF PLATE II.

- Fig. 1a. *Miotopus diversus*, supra-anal plate of male.  
 Fig. 1b. " " subgenital plate of male.  
 Fig. 2a. *Phaulacridium marginale*, end of abdomen of male from above.  
 Fig. 2b. " " end of abdomen of male from the side.  
 Fig. 2c. " " subgenital plate of female.  
 Fig. 3a. *Paprides furcifer*, end of abdomen of male from above.  
 Fig. 3b. " " end of abdomen of male from the side.  
 Fig. 3c. " " subgenital plate of female.  
 Fig. 4. *Paprides nitidus*, subgenital plate of female.  
 Fig. 5. *Paprides australis*, subgenital plate of female.  
 Fig. 6. *Paprides torquatus*, subgenital plate of female.  
 Fig. 7. *Paprides armillatus*, subgenital plate of female.  
 Fig. 8a. *Trigoniza directa*, end of abdomen of male from above.  
 Fig. 8b. " " end of abdomen of male from the side.  
 Fig. 8c. " " subgenital plate of female.  
 Fig. 9. *Trigoniza campestris*, subgenital plate of female.  
 Fig. 10. *Trigoniza rugosa*, subgenital plate of female.  
 Fig. 11a. *Brachaspis nivalis*, end of abdomen of male from above.  
 Fig. 11b. " " end of abdomen of male from the side.  
 Fig. 11c. " " subgenital plate of female.  
 Fig. 12. *Brachaspis collinus*, subgenital plate of female.  
 Fig. 13a. *Brachaspis petricolus*, subgenital plate of female.  
 Fig. 13b. " " sternal shield of female.  
 Fig. 14. *Brachaspis terrestris*, subgenital plate of female.
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ART. V.—Revision of the New Zealand Phasmidæ.

By Captain F. W. HUTTON, F.R.S.

[Read before the Philosophical Institute of Canterbury, 2nd November, 1898.]

LAST year when I read my paper on the *Phasmidæ* of New Zealand\* I never thought that I should so soon be in a position to correct the nomenclature of the species; but last August

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\* Trans. N.Z. Inst., xxx., art. xx.

Mr. H. Suter submitted to me for examination a large collection of these insects which he had obtained from the Great Barrier Island, and he has very kindly given to the Canterbury Museum a complete set of the species it contained. This collection, coming from the north, from whence all the earlier-described species came, has enabled me to identify all but one of the species described by Mr. Westwood, and all but two of those described by the Rev. W. Colenso; and I am therefore, thanks to the aid of Mr. Suter, in a position to make what I believe to be an accurate list of the known species.

I find that, having had southern specimens only to examine, I made some wrong identifications in my last paper. I therefore now withdraw all the localities given in it, and substitute those in the present paper.

I feel rather doubtful about reintroducing the genus *Acanthoderus*, of Gray, as it is not defined either by Stål or by Brunner. Gray's type—*A. spinosus*, from Western Australia—was in the Hope collection, and may have been seen by Westwood, who placed *A. spiniger* and *A. horridus* next to it, followed by *A. prasinus*. But the generic characters say that the mesothorax is nearly as long as the metathorax, which is not the case in *A. horridus* (= *A. spiniger*), but is true for *A. prasinus*. I therefore suppose that *A. prasinus* is congeneric with *A. spinosus*, but the point can only be settled by a comparison of the two species. The *Acanthoderus* of Stål, in his "Recensio Orthopterorum" (p. 49)—given as *Acanthoderus* (Westw.)—is, as he says, very different, and belongs to a different family. But Stål had no right thus to shift Gray's name.

As references to descriptions and figures of the species are given in my last paper, I have not thought it necessary to repeat them here.

All the New Zealand *Phasmidæ* belong to the tribe *Clitumnides*, as defined by Brunner de Wattenwyl in his "Révision du Système des Orthoptères," 1892. The antennæ in the young are proportionately shorter in this tribe than in the adult, but they have the full number of joints.

#### Tribe CLITUMNIDES, Brunner (1892).

Antennæ shorter (or not much longer) than the anterior femora, the joints distinct and not more than 28. Median segment of the metanotum short. Apterous. Tibiæ carinated below to the apex, and without any apical areola.

In all the New Zealand species the suture between the median segment and the metanotum proper is obliterated, but its position is generally marked by a spine, or a pair of spines; or, in *Clitarchus*, by a black spot.

## Genus PACHYMORPHA, Gray (1835).

In the New Zealand species the number of joints in the antennæ is from 16 to 20. The first abdominal segment is subquadrate, and the first joint of the anterior tarsi is twice as long as the second. In *P. hystriuclea* the anal segment of the female (judging from the figure) is long and compressed, completely hiding the styles, as in *P. squalida*; but in the three species described by me it is expanded and rounded at the end, while the styles are exposed. They thus approach more nearly those species which Brunner has put into his genus (or subgenus) *Parapachymorpha*, but they do not quite come within any of his sections.

## ARTIFICIAL KEY TO THE SPECIES.

Thorax with spines.

Two spines on the middle of the mesothorax .. *P. hystriuclea*.

No spines on the middle of the mesothorax .. *P. annulata*.

Thorax without spines.

Two tubercles between the eyes .. .. *P. salebrosa*.

No tubercles between the eyes .. .. *P. acornuta*.

**Pachymorpha hystriuclea**, Westwood (1859).

The antennæ are 16-jointed. The mesothorax has two spines near its anterior extremity, two near the middle, and two near the hind margin, and the hinder extremity is armed with several smaller spines. The metathorax has a pair of spines near its fore end, and its extremity is dilated and armed with several divergent spines. The six basal segments of the abdomen are armed with a spine on each side near the base, the fourth segment being furnished with a dorsal and two lateral foliaceous appendages. The terminal segments of the abdomen are narrower than the others. The ovipositor is emarginate at the tip, and does not reach to the apex of the ninth segment. (Westwood.)

This species is not represented in the Museum collection.

**Pachymorpha salebrosa**, sp. nov.

*P. hystriuclea*, Hutton, Trans. N.Z. Inst., vol. xxx., p. 162, not of Westwood.

*Female*.—Colour almost uniformly brown when dry. Antennæ 20-jointed. Head with two black tubercles between the eyes, united at their bases. Thorax and abdomen very rough with short points, but no spines, except a row of short ones on the meta-episterna, and a distant pair at the posterior margins of the mesonotum, metanotum (proper), median segment, and the first five abdominal segments. The third and fourth abdominal segments with dorsal and lateral foliaceous appendages, those on the third smaller. First abdominal segment rather longer than broad. Anal segment rather

longer than broad, rounded at the apex. Cerci exposed. Ovipositor large, rounded at the apex, not reaching much beyond the end of the eighth segment. Fore femora with a few denticulations both above and below. Middle femora with two or three strong teeth in each row above and two in each row below. Hind femora with four or five strong teeth in each row above and two small ones below. All the tibiæ denticulated.

Length of the body, 54 mm.; of mesonotum, 11 mm.; of metanotum, 9 mm.; of the abdomen, 29 mm.; of the antennæ, 9 mm.; of the fore femora, 13 mm.; of the mid femora, 11 mm.; of the hind femora, 14 mm.

Male unknown.

*Hab.* Dunedin.

***Pachymorpha annulata*, Hutton (1898).**

The antennæ have 17 joints, the base of the seventh and the whole of the seventeenth pale. The first abdominal segment is rather broader than long. The anal segment is rather longer than broad, rounded and slightly emarginate at the apex. The cerci are exposed. Ovipositor extending about two-thirds the length of the ninth segment.

Male unknown.

*Hab.* Dunedin.

***Pachymorpha acornuta*, sp. nov.**

*Female*.—Body subtectiform, a keel running down the back. Yellowish-grey mottled with darker, a transverse fuscous mark on the head between the eyes, and a single fuscous spot on the posterior margins of the pronotum and mesonotum. Bases of the middle and hind femora paler and yellowish. Head with a low transverse ridge between the eyes, not divided. Antennæ 16-jointed, the tips of the last joint fuscous. Basal joint of antennæ, head, and pronotum more rugose than the rest of the body, but without any trace of spines, except a short one at the posterior end of the mesonotum. Metanotum with two short spines, one behind the other, near the posterior end. The first seven abdominal segments each with a single short spine near the posterior margin, and a few low tubercles on each side of it. No foliaceous appendages. A row of small tubercles on the episterna of the meso- and meta-thorax. Sterna with a few low tubercles, those of the abdomen with a pair near the posterior margin of each segment. First abdominal segment broader than long. Anal segment as broad as long, rounded and slightly emarginate at the apex. Cerci exposed. Ovipositor slightly keeled, reaching the end of the ninth segment; the apex acute. All the femora and tibiæ with blunt denticu-

lations above, and the femora of the middle and hind legs have three very small ones below, in a row.

Length of the body, 43 mm.; of mesothorax, 9 mm.; of metathorax, 6 mm.; of abdomen,  $22\frac{1}{2}$  mm.; of antennæ, 7 mm.; of fore femur, 11 mm.; of mid femur, 8 mm.; of hind femur, 10 mm.

Male unknown.

*Hab.* Great Barrier Island.

An immature specimen, probably belonging to this species, is much smoother, and the fourth abdominal segment has a slight dorsal expansion. The fore femora are almost smooth, and the denticulations of the middle and hind femora are very small.

This species is easily distinguished from any of the others by the absence of the two tubercles on the head, by the spines on the abdomen being single instead of in pairs, and by the absence of lateral expansions on the abdomen.

#### Genus CLITARCHUS, Stål (1875).

*Clitarchus*, Section A, Hutton, Trans. N.Z. Inst., vol. xxx., p. 162.

The first abdominal segment is much longer than the median segment of the metanotum. In the male the last abdominal segment is inflated, and the anal styles are fully exposed.

#### ARTIFICIAL KEY TO THE SPECIES.

Fore femora with 5 or 6 strong teeth.

Middle femora with two denticulations on inferior ridge.

Posterior femora with two denticulations on inferior ridge .. .. . *C. hookeri*.

Posterior femora with one or no denticulations on inferior ridge .. .. . *C. colareus*.

Middle and posterior femora without any denticulations on inferior ridge .. .. . *C. reductus*.

Fore femora smooth, or with a few slight denticulations *C. læviusculus*.

#### *Clitarchus hookeri*, White (1846).

The *female* is subrugose, the head and thorax distantly granulated, the granules on the vertex generally arranged in a V. The bases of the fore femora are rosy. The antennæ are pale, each joint with a black spot at the distal end; they are 21-jointed. Length of the body, 91 mm.; of mesothorax, 18 mm.; of metathorax,  $16\frac{1}{2}$  mm.; of abdomen, 46 mm.; of antennæ, 22 mm.; of anterior femur, 22 mm.; of middle femur, 15 mm.; of posterior femur, 19 mm.

The *male* has a few—up to six—granules on the mesonotum arranged in two rows; and the fore femora have five teeth, the middle and posterior femora have two small denti-

culations (in addition to the distal pair) on the inferior ridge. There is sometimes a dark lateral stripe on the head and thorax, and a black spot on the centre of the posterior margin of each abdominal segment. Length of the body, 64 mm.; of mesothorax, 15 mm.; of metathorax, 13 mm.; of abdomen, 32 mm.; of antennæ, 25 mm.; of anterior femur, 19½ mm.; of middle femur, 14 mm.; of posterior femur, 16 mm.

*Hab.* Great Barrier Island and northern parts of New Zealand, where it is common, the males nearly as abundant as the females.

#### **Clitarchus coloreus**, Colenso (1885).

In this species the head and thorax are nearly smooth, and the colour is lighter—in North Island specimens—than in *C. hookeri*, but it is probably only a variety of that species. The antennæ are from 22- to 24-jointed.

In the *female* the fore femora have five teeth, the middle femora have two small denticulations on the inferior ridge, and the posterior femora have the inferior ridge either smooth or with a single denticulation. Length of the body, 86 mm.; of mesothorax, 17½ mm.; of metathorax, 15 mm.; of abdomen, 43 mm.; of antennæ, 22 mm.; of anterior femur, 21½ mm.; of middle femur, 15 mm.; of posterior femur, 19 mm.

In the *male* the fore femora are smooth or slightly denticulated. The colours are the same as in the female, but usually there is a dark lateral band on each side, more strongly marked on the head and thorax than on the abdomen. Also the anterior margins of the abdominal segments often have a small black spot on each side of the median dark line. Length of the body, 58 mm.; of mesothorax, 10½ mm.; of metathorax, 11 mm.; of abdomen, 31 mm.; of antennæ, 24 mm.; of anterior femur, 16 mm.; of middle femur, 13 mm.; of posterior femur, 15 mm.

*Hab.* Great Barrier Island (abundant, both males and females); Hawke's Bay; Canterbury.

Mr. Colenso describes the eggs as being laid in June. The single specimen I have from Canterbury is of a dark-brown colour (dry), and looks very different from those from the Great Barrier.

#### **Clitarchus reductus**, sp. nov.

*Female*.—Pale-green, with a narrow black median line on the prothorax and a black median spot at the posterior margin of the mesothorax, metathorax, and first abdominal segment; bases of the anterior femora pink. Head smooth, with six or eight rounded tubercles; thorax smooth, with a few scattered granules on the mesonotum. Antennæ 21-jointed. Fore femora with six strong teeth, the inferior

ridge of the middle and posterior femora quite smooth. Sometimes there is a slight denticulation on the outer (anterior) ridge of the posterior femora near the base. Both middle and posterior femora with a pair of strong subapical teeth as well as the apical pair.

Length of the body, 92 mm.; of mesothorax, 18 mm.; of metathorax, 16 mm.; of abdomen, 49 mm.; of antennæ, 21 mm.; of anterior femur, 25 mm.; of middle femur, 17 mm.; of posterior femur, 19 mm.

The male is unknown.

*Hab.* Canterbury.

Formerly this species used to be common in the neighbourhood of Christchurch.

### **Clitarchus læviusculus**, Stål (1875).

Smooth, and with only a few or no denticulations on the anterior femora.

*Hab.* Great Barrier Island, not common; Canterbury.

### Genus ACANTHODERUS, Gray (1835).

*Clitarchus*, Section B, Hutton, Trans. N.Z. Inst., vol. xxx., p. 164.

The first abdominal segment is rather longer than the median segment of the metanotum.

#### ARTIFICIAL KEY TO THE SPECIES.

|  |                          |
|--|--------------------------|
| Second and following abdominal segments without spines.. | <i>A. prasinus</i> .     |
| Second and following abdominal segments with spines.     | ..                       |
| Femora not foliated .. ..                                | .. <i>A. suteri</i> .    |
| Femora distinctly foliated.                              | ..                       |
| Colour green .. ..                                       | .. <i>A. geisovii</i> .  |
| Colour grey, variegated dark and light ..                | .. <i>A. fasciatus</i> . |

### **Acanthoderus prasinus**, Westwood (1859).

*Bacillus atro-articulus*, Colenso (1885).

Only the female is known. Antennæ with 23 joints. Length of the body, 94 mm.; of mesothorax, 17 mm.; of metathorax, 16½ mm.; of abdomen, 51 mm.; of antennæ, 19 mm.; of anterior femur, 24 mm.; of middle femur, 15½ mm.; of posterior femur, 19½ mm.

*Hab.* Great Barrier Island, a few specimens; Hawke's Bay; Canterbury.

### **Acanthoderus suteri**, nov. nom.

*Clitarchus geisovii*, ♀, Hutton, Trans. N.Z. Inst., vol. xxx., p. 165, not of Kaup.

In this species the spines on the thorax are slender and pointed, as in *A. prasinus*, and differ much from those of

*A. geisovii*. The antennæ are broken, so that I cannot give the number of joints.

The male is unknown.

*Hab.* Marton, near Wanganui.

I name this species after my friend Mr. H. Suter, who has done so much good work in the investigation of the New Zealand Mollusca, and without whose help I should not have been able to identify the true *A. geisovii*.

***Acanthoderus geisovii*, Kaup (1866).**

*Female*.—Pale-green, with a black spot on the base of the head, and others on the anterior and posterior margins of the pronotum, as well as on the posterior margins of the meso- and meta-nota, and each of the abdominal segments; also black spines on the head, thorax, and abdomen. Distal ends of the tibiæ and joints of the tarsi dark. Antennæ with 20 joints. Head with about nine spines, of which a central pair are larger than the others. Pronotum with two longer pairs near the posterior end. Mesonotum with about fourteen spines, a pair at the posterior margin, the rest irregular. Metanotum with about twenty spines, of which there are two pairs, one on the median suture, the other at the posterior margin, the rest more or less irregular. All the spines are very robust, and the larger ones sometimes have their bases pale. The episterna of the mesothorax have four to seven sharp spines, those of the metathorax have five or six. The epimera have two, or one, or none. The mesosternum has three or four pairs, and the metasternum five irregular small spines. Each segment of the abdomen is swollen posteriorly, and has a posterior pair of blunt black tubercles. The first, second, and third have also a few rudimentary spines. From the second to the sixth lateral foliations are more or less developed. There are no spines on the abdominal sterna, except the one at the base of the ovipositor. The anal segment is truncated at the end; the cerci, or anal styles, are broad. The ovipositor is rounded at the tip, and does not project quite to the end of the ninth segment. The anterior coxæ have two pairs of spines. The anterior femora have three or four sharp teeth on the lower outer margin, and some smaller ones on the upper. The middle and posterior femora have three teeth on each of the upper and lower ridges. All the femora are distinctly foliated. The middle and posterior tibiæ have a blunt tooth above, near the proximal end. The abdomen is narrow. Length of the body, 74 mm.; of meso-thorax, 13 mm.; of metathorax, 13 mm.; of abdomen, 40 mm.; of antennæ, 19 mm.; of anterior femur, 20 mm.; of middle femur, 13½ mm.; of posterior femur, 16 mm.



*Male*.—"The ten black spines of the head are placed in three rows. On the end of the prothorax, in the middle, a black spot; and a fine line along the middle of the mesothorax. Some of the irregularly formed and placed spines are black at the ends. The tubercles of the metathorax obtuse and unicolour. The leaves look short; anal styles on both sides in the middle carinated" (Kaup). Length of the body, 39 mm.; of mesothorax,  $7\frac{1}{2}$  mm.; of metathorax,  $8\frac{1}{2}$  mm.; of abdomen, 23 mm.; of antennæ, 8 mm.

*Hab.* Great Barrier Island, several females; Canterbury, one female.

### ***Acanthoderus fasciatus*, sp. nov.**

Pale-grey, variegated with darker. Femora and tibiæ with transverse dark bands. Posterior end of each abdominal segment dark. Antennæ 20-jointed. Head with about ten spines, one pair larger than the others. Pronotum with two pairs of spines near the posterior margin, the anterior pair much smaller. Mesonotum with about thirty-four thick spines placed irregularly, except the posterior pair. Metanotum with about twenty-four thick spines. Episterna of the meso- and meta-thorax with a row of seven spines. Eight small spines on the mesosternum and six on the metasternum. Abdomen as in *A. geisovii*, the fourth, fifth, and sixth segments with lateral expansions. Anal segment squarely truncated at the end. Ovipositor not reaching to the end of the eighth segment. Femora foliaceous; the anterior with five teeth above and seven on the outer lower margin. Middle and posterior femora with four strong teeth on each of the four ridges. Middle and posterior tibiæ with a strong tooth on the upper side, near the proximal end.

Length of the body, 54 mm.; of mesothorax, 10 mm.; of metathorax,  $9\frac{1}{2}$  mm.; of abdomen, 30 mm.; of antennæ, 9 mm.; of anterior femur, 14 mm.; of middle femur, 10 mm.; of posterior femur,  $10\frac{1}{2}$  mm.

*Hab.* Great Barrier Island. A single specimen.

This species is allied to *A. geisovii*, but is distinguished from it not only by its colours, but by the more numerous spines on the thorax, and the stronger teeth on the legs.

### Genus ARGOSARCHUS, Hutton (1898).

The first abdominal segment is considerably longer than broad, nearly twice as long as the median segment of the metanotum. The suture between the median segment and the rest of the metanotum is not marked by spines, as it is in *Acanthoderus*. In the male the basal joints of the tarsi are not crested.

**Argosarchus horridus**, White (1846).

*A. spiniger*, White, ♂; *B. filiformis*, Colenso, ♂; *B. gerhardii*, Kaup, ♀.

This well-known species was represented in the collection from the Great Barrier Island by one male and one female, which have the following dimensions: Length of the body, ♀ 128 mm., ♂ 95 mm.; of mesothorax, ♀ 28 mm., ♂ 21 mm.; of metathorax, ♀ 25 mm., ♂ 19 mm.; of abdomen, ♀ 64 mm., ♂ 49 mm.; of antennæ, ♀ 29 mm., ♂ 29 mm.; of anterior femur, ♀ 36 mm., ♂ 24 mm.; of middle femur, ♀ 26 mm., ♂ 20 mm.; of posterior femur, ♀ 26 mm., ♂ 19 mm. The bases of all the femora are pale in colour, more broadly so in the male than in the female.

It is found throughout New Zealand, as far south as the West Coast Sounds of Otago.

ART. VI.—New Zealand Polyplacophora: *Keys to Genera and Species.*

By HENRY SUTER.

[Read before the Philosophical Institute of Canterbury, 2nd November, 1898.]

KEY TO GENERA.

- A. Valves lacking insertion plates . . . . . *Lepidopleurus.*  
 AA. Valves possessing insertion plates, valves i.-vii. or i.-viii. having slits; teeth smooth or but slightly roughened between the slits, never closely, finely pectinated; valves lacking eyes.  
 B. Surface of intermediate valves divided into lateral and central areas by a diagonal (often indistinct) extending from beak to outer front angle of tegmentum; or, if this is not clearly the case, the posterior valve has an even, crescentic series of well-developed teeth; all valves having slits.  
 C. Posterior valve having a crescentic series of well-developed teeth.  
 D. Valves porous at the eaves. Sutural plates connected across the sinus, side-slits several (-ingle in one species), girdle with compact diamond-patterned covering; gills as long as the foot . . . . . *Callochiton.*  
 DD. Valves solid at eaves, girdle densely covered with flat imbricating scales, side-slits single . . . . . *Ischnochiton.*

